

The Effect of Using Cooperative Learning Strategy on Graduate Students' Academic Performance and Gender Differences

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Abstract

The study aimed to investigate the effect of using cooperative learning strategy on graduate students' academic performance and gender differences in educational statistics and educational research method courses. The convenience sample used consisted (23) master's students' (18 female and 14 male) who study the educational statistics course, and (24) master's students' (13 female and 11 male) who study educational research method course from faculty of education at King Saud University. This study employed a quasi-experimental - nonequivalent control-group design with pretest, posttest and delayed posttest. In this study, educational statistics performance test (ESPT) and educational research method test was used to measure the students' performance. The both tests consisted of 30 multiple choice questions to collect the relevant data. The data collected was analyzed using independent samples t-test statistical methods. Findings of this study revealed that there was no significant difference in academic performance of male and female students at the pretest, posttest, and delayed posttest levels respectively. However, further investigations and analysis could be beneficial to obtain a complete vision of cooperative learning strategy for graduate students' and invest more empirical research studies about teaching and learning strategies.

Keywords: Cooperative Learning Strategy, Academic Performance, Gender, Graduate Students'.

1. Introduction

Educational statistics and educational research method plays a vital role for individuals who are eager to continue their graduate studies, and it is compulsory courses were all the graduate students in faculty of education should take in the first semester of their study. Thus, help students in an increasingly data-driven society, and it is vital that students' know how to locate, find, and interpret research on their own. Further, students' need to be able to conduct quality research to examine issues within their own contexts. Moreover, Statistics is an area of mathematics that collects, organizes and analyzes numerical data to identify existent patterns and probabilities inherent in the data. Statistics works with sets of numbers obtained from measurements made on a process, population or series of events.

Basically, students of higher learning should possess the necessary skills for knowledge achievement. Students of higher institutions are required to adapt meta-cognitive strategies and be motivated by setting high learning goals for their studies in order to continue as they come across different tasks for courses as they go through examination questions which are most likely to emphasize the need for understanding, elaboration, organization and less in memorization. Paulsen and Faust (2008) note that there is still a resistance and hesitation in higher education to transform traditional college classes into cooperative learning environments. Despite the pedagogical interest, under the false notions that cooperative learning is an alternative to, rather than an enhancement of professorial lectures, many avoid integrating cooperative learning into their classes (Paulsen & Faust, 2008). In fact, according to Weimer (2007) when asked about the teaching methods they most commonly employ, 76% of college professors reported that lecture was their "primary approach" to teaching. Even though many may dabble into the realm of cooperative learning as indicated by Fink (2004), it is not common practice. Due to the expert nature of higher education, much evidence suggests that many college professors still cling to the notion of expounding knowledge to their students rather than engaging them in discovering such knowledge through active learning (Ediger, 2001; Murry & Murry, 1992; Felder, 1992).

Gardner (1999) tells us that we are intelligent in various ways. This suggests that students can learn from a variety of teaching styles or by various modalities, to use other verbiage. Controversy Theory (Johnson, Johnson, & Smith, 1998) proposes that when students face opposing views, then they gather evidence to support one side and present the evidence to another adult to refute the position. Students can then look at the situation from multiple points of view. Behavior Learning Theory posits that students will work diligently for what they perceive as a reward and stop working if they perceive no reward or sanctions (Johnson, et. al, 1994). Cognitive Evaluation Theory suggests that students will continue working if they perceive feelings of competence and value (Cameron & Pierce, 1994). Cooperative learning offers enticements for those who participate in the group endeavors.

Therefore, the problem in many universities is that some instructor's continue to teach with traditional methods of instruction such as lecture and note taking, instead of using methods in which active learning place. However,

The purpose of this quantitative study was to compare the effects of cooperative teaching and learning strategies with traditional teaching strategies used by instructor's on master's students' academic performance in the faculty of education at King Saud University. The researcher attempted to determine the effects of two different teaching strategies on master's students' academic performance in two courses (educational statistics and educational research method).

Based on the above matter the researcher addressed the following specific hypothesis, which will guide this research;

1.1 Research Hypothesis

H01: There is no significant difference in the pretest, posttest and delayed posttest academic performance mean scores of male and female students in educational statistics course.

H02: There is no significant difference in the pretest, posttest and delayed posttest academic performance mean scores of male and female students in educational research method course.

1.2 Research Objectives

1- To determine if there are gender difference in educational statistics performance among students taught through cooperative learning strategy.

2- To determine if there are gender difference in educational research method performance among students taught through cooperative learning strategy.

2. Theoretical background of cooperative learning strategies

Cooperative learning is the umbrella term for a variety of educational approaches involving joint intellectual effort by students, or students and teachers together (Wendy, 2005). It requires a small number of students to work together on a common task, supporting and encouraging one another to improve their learning through interdependence and cooperation with one another (Larry and Hartman, 2002). The cooperative learning groups usually comprises two to five students in a group that allows everyone to participate in a clearly designed task (Sarah, 2006; Wendy, 2005). Students within small groups' cooperative learning are encouraged to share ideas and materials and divide the work when appropriate to complete the task. Small group competitive learning provides students with opportunity to explore and discuss topics with peers in a Bonds-on, interactive environment (Larry and Hartman, 2002). Gillies (2004) affirmed that students benefit academically and socially from cooperative small group learning.

The theoretical foundations of cooperative learning grew out of the work of social psychologist, Morton Deutsch, who specialized in the study of social interdependence (Kimberly et al., 2003). Deutsch studied the effects of different group structures on the process and outcomes of group efforts in a variety of social and work settings. There are two major theoretical perspectives related to cooperative learning-motivation and cognitive (Rossini and Jim, 1997). The motivational theories of cooperative learning emphasize the students' incentives to do academic work, while the cognitive theories emphasize the effects of working together. There are two cognitive theories that are directly applied to cooperative learning, the developmental and the elaboration theories (Slavin, 1987). The developmental theories assume that interaction among students around appropriate tasks increases their mastery of critical concepts (Damon, 1984). When students interact with other students, they have to explain and discuss each other's perspectives, which lead to greater understanding of the material to be learned. The struggle to resolve potential conflicts during collaborative activity results in the development of higher levels of understanding (Slavin, 1990). The elaboration theory suggests that one of the most effective means of learning is to explain the material to someone else. Cooperative learning activities enhance elaborative thinking and more frequent giving and receiving of explanations, which has the potential to increase depth of understanding, the quality of reasoning, and the accuracy of long term retention (Johnson et al., 1986).

Learning together strategy of cooperative learning was originally developed by David Johnson and Roger Johnson at the University of Minnesota. Students work in four or five heterogeneous groups on a group assignment sheet. During discussion, if students ask the teacher a question, the teacher will refer such students to their groups to find answer. After the group discussion, a leader is chosen to present group's result to the entire class, and groups receive reward together. Scores are based on both individual performance and the success of the group, but individual do not compete with one another. The learning together strategy of cooperative learning provides a conceptual framework for teacher to plan and tailor cooperative learning strategy according to their circumstances, students' needs, and school contexts (Ghazi, 2003).

2.1 Cooperative Learning and Academic Achievement

Study by Christian and Pepple (2012) investigated the effects of cooperative and individualized learning strategies on students' achievement in chemistry in Rivers State. Three hundred and seventy, 370 Senior Secondary II students drawn from six public secondary schools constituted the sample of this study. The 3x2x2 factorial pretest-posttest quasi-experimental and control design was adopted for this study. The topic of instruction was thermochemistry. Two research questions and two research hypotheses were posed for the study. Three instructional materials, cooperative learning workbook, CLW, branching programmed text, BPT and

conventional lesson note, CLN were used for intervention and a 35-item multiple choice chemistry achievement test, CAT was used for data collection. Mean, standard deviation, linear regression, ANCOVA and Scheffe Multiple Comparisons were used for data analysis. The results show statistically significant effect of learning strategies on students' achievement in chemistry with the following trend: conventional individualized cooperative. The result also shows a very weak and significant effect of the combination of all the predictor variables on students' achievement. However, relatively the effect of the individual predictor variables on students' achievement in chemistry was found to describe the following trend: age < gender < learning strategies with learning strategies and gender having significant relative effect students' achievement.

Study by Oludipe (2012) investigated the influence of gender on Junior Secondary students' academic achievement in basic science using cooperative learning teaching strategy. Total number of one hundred and twenty (120) students obtained from the intact classes of the three selected Junior Secondary Schools in the three selected Local Government Areas of Ogun State, South-west Nigeria, participated in the study. This study employed a quasi-experimental design. Lesson note based on the jigsaw II cooperative learning strategy and Achievement Test for Basic Science Students (ATBSS) were the instruments used to collect the relevant data. The data collected was analyzed using descriptive and independent samples t-test statistical methods. Findings of this study revealed that there was no significant difference in academic achievement of male and female students at the pretest, posttest, and delayed posttest levels respectively.

However, Eccles, Lord, Roeser, Barber, & Jozefowicz (1997); Hyde & McKinley, (1997); Kolawole, (2007), in their studies found that male students performed better than female students in the cognitive, affective and psychomotor skill achievements. There is a strong association between gender and response to science education. The likely influence of gender factors on students' academic achievement in basic science when they are taught using the cooperative learning and conventional methods was examined by this study.

Viann (2002) investigated differences and the effects of cooperative learning in mathematics classroom setting. The researcher used quasi-experimental design to compare a control section using individualized learning method with three treatment sections using cooperative learning strategy based on the Learning Together model of Johnson and Johnson (1991). The results revealed no significant gender-related differences, but females achieved slightly higher grades than males.

Pandian (2004) investigated the effects of cooperative computer-assisted learning method on male and female students' achievement in biology. The students were randomly grouped into cooperative computer-assisted learning and traditional method groups. The analysis of results indicated that gender did not express any significant influence on biology achievement. However, male and female students in the cooperative computer-assisted instruction group showed remarkable post-test mean differences over their respective counterparts who learned the same biology concepts through traditional method.

Johnson, Johnson, and Smith (1998) assert that cooperative learning is suitable for college students. They found that students must learn to cooperate because today's students traditionally come from a background where cooperation within the family unit is not as important for survival as it once was (i.e., in an agrarian society). The corporate world values cooperation, hence cooperative learning is a valuable learning structure.

Potthast (1999) used a series of four cooperative learning strategies in a college level statistics course and found a greater atmosphere of cooperation, rather than competition, among his students and better communication with the instructor. Lindquist (1997) introduced cooperative learning to fellow professors in hopes that his colleagues would become familiar with, and be open to using, cooperative learning with their students.

3. Methodology

An experimental quantitative method was chosen in which one group received an intervention, while the other group did not. Creswell (2003) reported that, "The basic intent of an experiment is to test the impact of a treatment (or an intervention) on an outcome, controlling for all other factors that might control that outcome".

3.1 Research Design

The research was carried out using a quasi-experimental design with pretest, posttests and delayed posttest with one experimental groups and one control group from faculty of education at King Saud University. Convenience sampling was used. This sampling procedure allowed the participants in the study to be chosen based on availability. The rationale for selecting convenience sampling was the availability of naturally formed groups (Creswell, 2003). The sample consisted (23) master's students' (18 female and 14 male) who study the educational statistics course, and (24) master's students' (13 female and 11 male) who study educational research method course in the first semester 2013-2014. The sample was selected because of its availability. the researcher selected the nonequivalent control-group design with pretest, posttest and delayed posttest. Creswell stated that with this design, random sampling does not occur and pre- and posttests are administered to both groups, but only the experimental group receives the treatment . One group of students was the experimental group that received the treatment. The treatment use of cooperative learning strategy. The control group was instructed with traditional teaching methods. A pretest was administered and test scores were gathered. Then, the

units was taught to both groups the experimental group and the control group. At the conclusion of the unit, a posttest and delayed posttest was administered by the instructor and data was collected.

3.2 Procedures

- 1- At the beginning of the study, the instructor administered a pretest in educational statistics course and pretest in educational research method test before taught the two courses.
- 2- Then, treatment group for both courses were selected intentionally and instructed through cooperative learning strategies for six weeks
- 3- whereas the control group received traditional methods of instruction in both courses.
- 4- After that, the instructor administered a posttest measured academic performance reflect the units taught for both study group.
- 5- Delayed posttest were administered two weeks after the posttest
- 6- The researcher, compared test scores of the control group and the experimental group for both courses and determined statistically whether one group achieved significantly better scores than the other.

3.3 Instruments

In this study, educational statistics performance test (ESPT) and educational research method test was used to measure the students' performance. The both tests consisted of 30 multiple choice questions, each with three options and only one correct answer. The performance test was constructed based the text books used to tough the courses.

3.4 Validity

The instruments were validated by content and face-to-face validity methods. For validity, the instruments were revised with the suggestions of the experts in the field from the faculty of education at King Saud University. However, the items of the two test were adjusted and evaluated according to the experts comments.

3.5 Reliability

Reliability was found using Kuder –Richardson 21 for both tests. The 0.86 and 0.89 was found to be reliable based on McMillan and Schumacher (2006) criterion of a minimum of 0.70.

Table (1) reliability for (ESPT) and (ERMT) using Kuder – Richardson 21

Tests	Reliability	Test items	options
Educational statistics performance test (ESPT)	0.86	30	3
Educational research method test (ERMT)	0.89	30	3

3.6 Data Analysis

Pretest, posttest and delyead posttest data analysis was conducted with the use of independent sample t-test. This analysis was used to determine whether significant differences in students' performance occurred.

4. Result

Table (2) Independent sample t-test for (ESPT) scores of males and females

	Gender	N	Mean	S.d	t-value	df	Sig
Pretest	Male	10	13.55	2.85	2.344	21	.262
	Female	13	15.47	2.41			
Posttest	Male	10	24.44	2.43	1.21	21	.019
	Female	13	24.12	2.61			
Dposttest	Male	10	23.28	2.33	-2.01	21	.016
	Female	13	22.91	2.21			

The result showed in table (2) indicates that the 10 male students who participated in the study had pretest, posttest and delayed -posttest performance mean scores of (13.55, 24.44, and 23.28) respectively and standard deviations of (2.85, 2.43 and 2.33) respectively; while the 13 female students had pretest, posttest and delayed-posttest performance mean scores of (15.47, 24.12 and 22.91) respectively and standard deviations of (2.41, 2.61 and 2.21) respectively. However, the result indicates that there is no significant difference in the pretest, posttest and delayed-posttest academic performance mean scores of male and female students' in educational statistics course; $t(21) = 2.344, 1.21, \text{ and } -2.01$. Since $.26, .019, \text{ and } .016 > 0.05$. There was no evidance to suggest that significant difference existed between males and females after the intervention. As a result the null hypothesis 1 is accepted.

Table (3) Independent sample t-test for (ERMT) scores of males and females

	Gender	N	Mean	S.d	t-value	df	Sig
Pretest	Male	11	12.22	1.81	-1.11	22	.360
	Female	13	12.87	1.92			
Posttest	Male	11	24.50	2.40	-1.56	22	.185
	Female	13	25.46	2.44			
Dposttest	Male	11	25.17	2.22	-1.052	22	.278
	Female	13	25.65	2.39			

Table (3) shows that 11 male students who participated in the study had pretest, posttest and delayed -posttest performance mean scores of (12.22, 24.50, and 25.17) respectively and standard deviations of (1.81, 2.40 and 2.22) respectively; while the 13 female students had pretest, posttest and delayed-posttest performance mean scores of (12.87, 25.46 and 25.65) respectively and standard deviations of (1.92, 2.44 and 2.39) respectively. However, the result indicates that there is no significant difference in the pretest, posttest and delayed-posttest academic performance mean scores of male and female students' in educational research method course; $t(22) = -1.11, -1.56, \text{ and } -1.052$. Since $.360, .185, \text{ and } .278 > 0.05$. There was no evidence to suggest that significant difference existed between males and females after the intervention. As a result the null hypothesis 2 is accepted.

5. Discussion

This study was conducted to establish gender difference in master's graduate academic performance in educational statistics and educational research method courses. However, The result indicates that academic performance was not affected by gender and this could be that students were excited to continue with graduate studies, which require that the students obtained a high GPA by using strategic approach to study to achieve the best grades possible by adapting to the assessment demands. This is obtained by managing time and intellectual resources in line with the perceived criteria for high grades. Competing with others is the predominant motivation, and this perhaps may be the reason why no significant difference was found in the academic performance between male and female students taught extensively by cooperative learning strategy. Thus, this result is in close agreement with research findings who reported that there was no gender difference in science achievement (Enu et al. 2013; Daniel, 2012; Ajaja and Eravwoke, 2010; Arigbabu & Mji, 2004; Bilesanmi-Awoderu, 2006; Din, Ming, & Esther, 2004; Pandian, 2004; Samuel & John, 2004; Viann, 2002). Moreover, the findings of this study is in disagreement with findings by (Eccles, Lord, Roeser, Barber, & Jozefowicz, 1997; Hyde & McKinley, 1997; Kolawole, 2007) who found in their studies, at various times, that male students achieved significantly better than female students in science subjects. Johnson, Johnson, and Smith (1998) assert that cooperative learning is suitable for college students and the corporate world values cooperation, hence cooperative learning is a valuable learning structure.

6. Conclusion

Based on the findings it was concluded that there are no difference effect between cooperative learning strategy and competitive learning strategy in teaching of educational statistics and educational research method courses at graduate students. In addition to, there are no gender difference in students' academic performance when students are taught through cooperative learning strategy.

7. Recommendations

Further investigations and analysis could be beneficial to obtain a complete vision of cooperative learning strategy for graduate students' and invest more empirical research studies about teaching and learning strategies. Moreover, it is substantial for instructors to use new learning strategies, and understandings the ways in which adopt new teaching methodologies is more significant, to improve new learning strategies and to create new approaches to learning which is more convenient to graduate student's.

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